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ABSTRACT

During a 2-year period, Fox Valley Technical College (FVTC) in Wisconsin developed a "New Directions" project, funded by the Job Training Partnership Act (JTPA), that successfully identified, enrolled, and graduated 30 women in a training program for nontraditional occupations. Project activities included scheduling morning and evening classes to meet the needs of shift workers and developing an outline for a 10-week course covering the following topics: introduction to technical thinking, abstract reasoning, spatial relations, mechanical or electrical problems, tools, levers and simple machines, electricity, gears, and drive trains. After 10 weeks of classes, comparison of pretests and posttests showed significant gains in these areas for the women who completed the course. Many of the support services designed for the project, such as pretechnical mathematics and science courses, continue to be used for all students to ensure greater academic success. Expansion of the program is sought for the future to enroll 100 women in pretechnical developing aptitude courses. (Attached to the report are narratives and graphs of project development activities.) (KC)

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12-705-150-151 Developing Aptitude - Sex Equity

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Developing Apitutde Project - #12-705

A Developing Aptitude Model- Sex Equity

Summary Report

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APPLICATION ABSTRACT

Since 1980, Fox Valley Technical College (FVTC) has taken an active approach to sex equity. Efforts to eliminate artificial barriers to services and to program entry for nontraditional students have included a wide range of activities. "New Directions" a Fox Valley Technical College project funded by JTPA dollars successfully identified, enrolled, and graduated 30 women in nontraditional programs in a two-year period. Many of the support services designed for this project continue to be used for all students to assure greater academic success; pre-tech math and science courses are good examples. This proposal seeks to continue and expand the District's efforts to provide support to people entering or considering entry into nontraditional programs, primarily women, by funding research, curriculum development, and the piloting of two 30-hour courses "Developing Mechanical Aptitude," and "Developing Electrical Aptitude." The goal of the project is to determine if mechanical and electrical aptitude can be increased through instruction further eliminating artificial barriers for women to nontraditional programs and training. Results of this project will be disseminated to all VTAE Districts and the Wisconsin Board of Vocational, Technical & Adult Education (WBVTAE.)

I. History

Fox Valley Technical College instructors' comments on student's lack of electrical and mechanical skill, and a request from a local industry to develop a course that would enable women employees to move into nontraditional jobs, led to the Developing Aptitude Sex Equity Project. This project was designed to measure student's mechanical and electrical aptitude prior to and after 30 hours of instruction in mechanical and electrical concepts.

An advisory committee (Attachment 1) of representatives from local industries was established to help provide guidelines for the implementation of the project. As a result of the advisory committee input, the instructor of the class and project coordinator toured the following industries: Valmet, Gilbert Paper, Wisconsin Tissue, Valley Wire, Square D, Miller Electric, and Rich Products. During the tours, women employees were interviewed to see if they would be interested in taking the course, and their suggestions for course content was requested. (See attachment 2).

The following information was gathered during the tours:
a) All plants are on the swing shift, so a day and evening section of the course must be scheduled.
b) Women employees were enthusiastic about the course.
c) Men at one plant felt discriminated against because it was a course for women.
d) Some women were not interested in upgrading themselves because they only wanted to work eight hours a day to have time for their families, ie. would not consider night shifts.

II. Recruitment

By the end of January 1991, 30 women were to be enroll in this project. From July 18, 1990 - September 4, 1990, six major companies in the Fox Valley were toured by the project advisor and instructor to enlist support and information (Attachment 2.) December 6, 1990 an advisory committee met to review material and recommend activities. (Attachment 3.) December 13, 1990 the project advisor attended the Design for Equity: Women in Electronics Advisory Board Meeting at NWTC together more information. (Attachment 4.) Mid January 1991 an information flyer was mailed to interested women and personnel directors. (Attachment 5.) 37 women enrolled and a waiting list with an additional 48 women was formed.

III. Curriculum/Courses

A. Scheduling of Classes

Two class sessions a week were conducted, one session in the evening and a repeat session in the morning. We found through discussions with employers, prospective students and the advisory committee that offering the class on the evening/morning schedule provided the needed flexibility for those students who were employed on rotating shifts and those who had family commitments. This option eliminated the barriers that would otherwise have prevented manyu students participation in the project.

B. Course Outline: (Final Curriculum still under development.)

Class 1

I. Student Introductions

Objective: To get students to know each other and encourage student interaction in the classroom.

Activity: Students where broken into groups of four. Each student was given the opportunity to introduce themselves to their group and talk about themselves for 2 minutes. After all students in the groups completed one student from each groups completed one student from each group was selected to introduce and tell what they have learned about each student to the class.

II. Abstract Reasoning

Activity: Students were given an explanation of abstract reasoning, and problem solving techniques.

Students were shown sample problems on overhead projector and problems were solved through class discussion.

Students were given worksheets with problems for them to solve on their own, followed by class discussion on solving the problems.

III. Spacial Relations

Activity: Students were given an explanation of spacial relation problem solving, and class discussion on basic spacial relation problem solving techniques.

Example problems were presented to the students on overhead, problems were solved through class discussion.

Class 2

I. Class discussion

Activity: Class discussion on any mechanical or electrical problems they encountered at work or at home since last class session.

Students were allowed to ask questions about topics covered in previous class.

II. Tool Presentations

Activity: Student tool presentations given to the class followed by discussion on each tool presented.

Class discussion and demonstration by instructors of various types of hand tools.

Video; Hand and Power Tools by Hometime.

Class 3

I. Class Discussion

Activity: Class discussion on material covered in previous session and any mechanical or electrical problems encountered by the students since last class.

II. Tools Hand on Lab.

Activity: Students participated in hands on projects using various hand tools.

Class 4

I. Class Discussion

Activity: Class discussion on material covered in previous session and any mechanical or electrical problems the student encountered since last session.

II. Mechanical Advantage.

Activity: Lecture and class discussion on mechanical advantage, classes of levers, and simple machines.

Students participated in experiments using various classes of levers.

Students analyzed data from experiments and calculated mechanical advantage of the various types of levers and simple machines.

Class 5

I. Simple Machines.

Activity: Lecture and class discussion the circle, pulleys, and simple machines.

Students participated in experiments applying information obtained from lecture material.

Class 6

I. Discussion.

Activity: Class discussion on material covered in previous session

covering mechanical advantage, leverage, pulleys and simple machines.

II. Introduction to Electricity.

Activity: Lecture and class discussion on Introduction to Basic Electricity including what is electricity, how it is produced, electrical terms.

Class 7

I. Basic Electricty

Activity: Lecture and class discussion on electrical theory, ohms law, parallel and series circuits, volt-ohm meter and electrical components.

Students participated in experiments using volt-ohm meters and electrical components.

Class 8

I. Electricity in the home.

Activity: Lecture and class discussion on how electricy is used in the home, basic house wiring, components and electrical safety in the home.

Students participated in hand on wiring of simple house wiring projects.

Class 9.

I. Gears, Drive Trains, Simple Machines.

Activity: Class discussion on gears and drive trains and how they are used in machines.

Students participated in experiments using gears in various configurations and drive trains.

Class 10.

I. Review of course material.

Activity: Class discussion and review on all material covered in previous classes.

Question and answer session on any questions in the mechanical and electrical areas.

Tour of FVTC Technical Division.

C. Student Evaluations

Student evaluations were conducted at the conclusion of each class session. Student input allowed us to monitor the effectiveness of instruction and delivery techniques. The evaluations also provided us with information as to the needs of the students allowing us to modify the curriculum to include those topics requested by the students.

Comments from the evaluations included:

--enjoy open, friendly atmosphere; good teachers!

--liked instructors asking for questions and discussion

--enjoyed the spacial relation and abstract reasoning problems but wanted more difficult problems

--looked forward to the next class

--enjoyed actually using the tools

--enjoyed all of the hands-on --- and would have like more

--the electricity classes were great!

--feel better really understanding safety issues re. electricity

--interested in more classes about electricity, mechanics and physics.

--were confused by the six hours of physics but liked the experiments and understood the need for the content

--class was better than expected but still so much more to learn

--will tell friends about the class

IV. Test results

In February of 1991, 37 women from local business and industry were assessed in Mechanical Reasoning, Abstract Reasoning, Space Relations, and electrical skills. The average percentile for that initial testing in Mechanical Reasoning was the 31st percentile. In Abstract Reasoning the average percentile was 53. In Space Relations the average percentile was 56.5, and in electrical skills the average percentage (rather than percentile) was 42.

After the initial test session, 9 women chose not to continue in the study. For the next 10 weeks, 28 women attended instructional classes on a weekly basis in all of the above areas. In May of 1991, these remaining 28 women were retested. In all areas a significant improvement was shown. In Mechanical Reasoning the average percentile was 57.5 with an increase of 1 standard deviation. In Abstract Reasoning the average percentile was 80 with an increase of 1 standard deviation. In Space Relations the average percentile was 76 with an increase in performance but within the same standard deviation. A standard deviation is defined as being a measure of the variability or dispersion of a distribution of scores. The more the scores cluster around the mean, the smaller the standard deviation. For a normal distribution, approximately two-thirds of the scores are within the range from one standard deviation below the mean to one standard deviation above the mean. On the electrical test the average was changed to 69 percent with an increase of 27 percent.

Business and industry, when looking for new employees or promoting from within, will establish cutoff levels for these aptitude tests specific to the needs of their own company. Some of the methods for determining such cutoffs are:

1. A set percentile for <u>each</u> test (ex. 50th percentile on Mechanical Reasoning, 85th percentile on Space Relations, etc.)
2. A set percentile for all tests (ex. 50th percentile on all tests)
3. An average percentile on all tests (ex. 70th percentile when averaged together)

There do no appear to be any companies in this district that will accept a cut off level below the 50th percentile.

In the examiners experience, of the companies within the FVTC District use test results as the sole criteria for determining whether or not a candidate will be chosen for promotion, an apprenticeship, or new hire Other factors such as seniority, past experience, education, work habits, attendance, and recommendations, all play an important part in such decision making.

The job positions available in business and industry that require the aptitudes in this assessment have traditionally been held by males. Therefore, the scores obtained for this study were from the norms table for men, making these women more competitive in the job market.

(Attachment 6)

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V. Summary of findings/recommendations

Recruitment: The response to the advertising for the project was almost triple the desired outcome. Eighty three women requested signing up for the course. We over-registered anticipating some dropouts and began the classes with thirty seven rather than thirty.

Classes should be offered to women and men in the future.

Curriculum: The testing tools were found to be satisfactory. Much more curriculum was developed than could be used in thirty hours. This curriculum will be used in the 1991-92 project.

Both daytime and evening classes should be offered simultaneously to allow for swing shift workers to attend every class.

More "hands on" experiences, along with theory" should be offered. Participants often stated they learned best in that learning style.

Two separate classes, one mechanical and one electrical, should be offered with both having at least 30 hours of instruction.

Assessment/Reassessment: Mechanical reasoning, space relations, abstract reasoning and electricity were the four areas for assessment. The retest scores, following ten weeks (30 hours) of class, were all significantly improved to within or above the acceptable standard deviation (above 50%) for many companies to accept the participants into nontraditional job opportunities.

(See IV Test results and Attachment 6 for details.)

Future Plans: Through the 1991-92 Pre-Technical Developing Aptitude project at FVTC, a continuation/expansion of the 1990-91 project, 100 females will be provided with nontraditional career exploration and Pre-tech aptitude activities, leading to the enrollment of participants in nontraditional vocational-technical and apprentice program or advancements within their companies. Curriculum for mechanical and electrical pre-tech classes will be further refined and expanded. Pre-tech mechanical and electrical courses will be offered at FVTC in the future to both women and men. Twenty-five participants will participate in Program Tryouts.

FOX VALLEY TECHNICAL COLLEGE

Conference/Meeting Report

Name of Conference/Meeting: Developing Aptitude-Sex Equity

Date: June 20, 1990 **Time:** 7:30 a.m.

Place: FVTC - E-114A

Chair: C. Mewhorter **Recorder:** D. Schuff

Attending: Kay Burroughs-Wisconsin Tissue, Chuck Carpenter-Valley Cast, Tom Harke-FVTC, Linda Kottke-FVTC, Dottie Kramlich-FVTC, Carolyn Mewhorter-FVTC, Virgil Noordyk-FVTC, Mike Skahan-Rich Products, Chuck Snyder-Valmet, Bob Wodill-FVTC

Copies to: All of the above; Dr. Spanbauer

Overview

Virgil Noordyk related two recent comments that led to the application for state administered funds. 1) FVTC instructors' comments on student's lack of electrical and mechanical skill, and 2) a request from a local industry to develop a course that would enable women employees to move into non-traditional jobs. As a result of this information, Carolyn Mewhorter and Virgil designed a project that would measure student's mechancial and electrical aptitude and provide 30 hours of instruction to increase their potential for success. The project would focus on women to eliminate artificial barriers to non-traditional occupations.

Discussion and Clarification

A question was asked on the selection and screening of applicants. Discussion included male dominated apprenticeship selection processes, contract negotiated agreements, and barriers to women in non-traditional areas. Other aspects of the problem include age, work schedules, loss of feminity, and low confidence levels.

It was agreed that FVTC would seek business and industry participation to provide women employees for the research, and determine what competencies are required.

It was indicated that the team concept supports cooperative efforts, better communications, and varied skill levels. Some people felt it was an opportunity for employers to hire women and for existing employees to upgrade their skills.

Plan of Action

- **Selection**
  - 50 applicants: 15 mechanical, 15 electrical, and 20 in control group.

    or

- 20 in each group and each group would serve as the control for the other.
- It was recommended that class size be a minimum of 16 and a maximum of 20.
- Companies could determine which class their employees would attend in an effort to also upgrade skills.
- FVTC will provide a program description to assist companies in recruiting and selecting candidates.
- This special research project is restricted to women.

Evaluation Testing

- Screened by FVTC staff.
- Suggest job titles be identified to determine impact.
- Pre-test and post-test results would be confidential.

- **Instructional Content**

  - Tom Harke and Bob Wodill will visit each company to determine needs and expectations.

- **Delivery**

  - Classroom instruction time frame will be tailored to requirements of business and industry. A course will be 30 hours in length.

- **Reassessment**

  - A follow up report on the project will be written. A positive response could result in pre-tech classes being offered.

- **Costs**

  - Instructional costs are covered by the project; employee time would be the responsibility of business and industry.

- **Timetable**

  - **July 1990**
    - — Tom and Bob will commence on-site visits to companies and determine interest, communicate with employees, and clarify expectations.
    - — Business and industry will report list of prospective candidates to Virgil.
  - **Fall 1990**
    - — Pre-aptitude testing of volunteers.
  - **January 1991**
    - — Classes will commence.

Advisory Committee

At this time, the group present at this meeting will constitute an advisory committee for this project. The next meeting will be scheduled for September 1990 to report on the status of the project.

SEX EQUITY UPDATE
September 25, 1990

Tom Harke and I toured the following companies:

July 18, 1990
VALMET - Contact Person: Chuck Snyder, Human Resources
Interested in sending five customer reps (women) to the class.

July 25, 1990
GILBERT PAPER - Contact Person: Bill Buibeault, Human Resources
Interviewed four women that worked in the plant - three were interested in the class.

August 1, 1990
WISCONSIN TISSUE - Contact Person: Jack Stiedl, Maintenance Supervisor
Kay Burroughs, Human Resources
One woman has called me and expressed interest in the class.

August 6, 1990
VALLEY WIRE - Contact Person: Chuck Carpenter, Human Resources
Chuck was on overload.

August 29, 1990
SQUARE D, OSHKOSH - Contact Person: Matt Worth
Talked with several women - one expressed interest in the class.

September 4, 1990
MILLER ELECTRIC - Contact Person: Michael Weller, Human Resources
Explained project to Mr. Weller.

Concerns
All of the plants are on the swing shift, so we must run a day and evening section of each course. Men at Wisconsin Tissue feel this project is reverse discrimination. They want to take the class.

Tom has the list of what employers and employees want in the classes. Tom has the returned surveys.

Reasons expressed why women at plants are not interested in apprenticeships or maintenance jobs:
1) husbands do not wives to have dirty fingernails
2) want to spend extra time with family / no overtime hours

FOX VALLEY TECHNICAL COLLEGE

Conference/Meeting Report

Name of Conference/Meeting: Developing Aptitude/Sex Equity Meeting

Date: December 6, 1990 **Time:** 7:30 a.m.

Place: Room E114

Chair: Virg Noordyk **Recorder:** Carolyn Mewhorter

Attending: Chuck Snyder (Valmet), Tom Bilstadt (Glatfelter), Chuck Carpenter (Valley Cast), Linda Kottke (FVTC), Carolyn Mewhorter (FVTC), Tom Harke (FVTC), Dottie Kramlich (FVTC), Ken Holmes (FVTC), Ron Melhaney (Consultant--VTAE), Connie Swift (FVTC), Mike Skahan (Rich Products), Ron Brown (Square D), and Virg Noordyk (FVTC)

Absent:

Copies to: All of the above

1. **Call to Order**

   The meeting was called to order and the minutes of the June 20, 1990, meeting were reviewed. There were no questions and/or changes regarding the last meeting minutes.

2. **Activity Update**

   Tom Harke and Dottie Kramlich have toured a number of businesses and industries, interviewing both personnel officers and employees. Their efforts have been to identify the needs, i.e., what needs to be taught, and to identify the barriers. Two barriers that have been identified are the swing shift and women not wanting to work overtime.

   Eighteen women from business and industry have been identified as being interested in taking the Developing Aptitude course. Four to five other women at Fox Valley Technical College have also been identified.

   A problem Tom Harke pointed out was that many of their visits were made during the summer which is not a good time to do this because so many people are on vacation.

   All of those people contacted by Tom and Dottie were very helpful and supportive.

3. **Participant Selection**

   Those 18 women identified from business and industry come from 3 to 4 companies. Chuck Carpenter sent a letter out to his employees informing them of this educational opportunity. To date, he has not gotten feedback. We (FVTC) will be contacting those people who have indicated an interest and providing them with specific information on the course specifics--date, time, and other information.

4. **Testing**

The pretest will be done the first day of class. The posttest will be done the last day of the class. Linda Kottke explained the testing that will be used. The tests are normed to the 12th grade level and beyond. Test results do not necessarily show scores, rather they rank above and below significant levels.

Chuck Snyder inquired as to why the verbal and numerical testing had been excluded. He felt that it would be important so that those participants meeting it could pursue GOAL. The verbal and numerical testing was discussed by members of the committee at length and it was decided that this testing would be reserved until the end of the class, that way the testing would be nonthreatening.

The instructors will go over the test results with participants so that they have an understanding of services available to them through FVTC should they be interested in pursuing them.

5. **Classes**

A typical outline of the class was distributed. Tom Harke discussed the Mechanical class and Ken Holmes the Electrical class.

It was suggested that companies send guest speakers to class. Women currently employed in nontraditional positions, for example there is a woman at Gilbert Paper, would be very good resources for the instructors. Marge Wood, WBVTAE, has been a plumber for the past ten years. She might be interested in coming in and speaking to the classes. It was agreed that bringing in resource people was an excellent idea. However, Virg Noordyk pointed out that the most basic people to bring into these classes would be machine operators.

The configuration of the class was discussed. It was pointed out that the two classes could be joined at various times or the entire class could be done as one group breaking out for the electrical and mechanical modules. Tom and Ken, the instructors, could team teach. It was pointed out that if the classes were joined, there would be a loss of the central group. The best idea would be to do <u>some</u> joint activities.

Dates for the class were determined to be either the first or the second week in February. The morning class will run from 7:30 to 10:30 a.m. and the evening class will run from 6 to 9 p.m. The classes will meet for three hours each, once a week for ten weeks. The evening class will run on Tuesdays or Wednesdays and the morning class will run on Thursdays.

A generic flyer will be prepared by the staff at FVTC and will be mailed out to employers so that they can post it in places where it will be visible to their employees.

6. **Other**

Connie Swift, who will assume responsibility on the part of the Wo/Men's Educational Bureau, was introduced to the committee members. Connie will be working very closely with Tom Harke and Ken Holmes in informing, recruiting, and doing intake on those women who will participate in this project.

The advisory committee meeting of "Women in Electronics" will be held Thursday, December 13, 1991, in Green Bay. Lorain Baldus of the University of Wisconsin System and Fran Johnson from the State Board will be at that meeting. Hopefully Tom Harke and/or Connie Swift will be able to attend that meeting for information.

W002B91

Conference/Meeting Report

Name: Design for Equity: Women in Electronics Advisory Board Meeting

Date: December 13, 1990 Time: 8:00 a.m. - 12:00 noon

Place: NWTC - Building 4, Room 4117

Chair: Lorayne Baldus, Project Director Women in Electronics Project

Recorder: Connie Swift's notes

Attending: See Participant List

Copies to: FVTC file

The morning was spent formulating a working model for the "Women in Electronics" project. Brainstorming ideas from the October 11, 1990 meeting were incorporated into a working model. "Collaboration" is the key to success in the project. Specific areas/concepts discussed included:

- the model must be workable and affordable
- sample curriculum displays included ONOW's "Nontraditional Occupations for Women" and The Nuts and Bolts of NTO.
- role models and mentors are important
- an internship towards the end of actual training would be very useful
- regular Electronics teachers should teach the Tech Prep/Pre-Tech classes
- a coordinator for the project is essential to the project's success

WHAT: 30-hour Mechanical/Electrical Aptitude Course (The goal of the project is to determine if mechanical and electrical aptitude can be increased through instruction, further eliminating artificial barriers for women to nontraditional programs and training.)

SPONSORED BY: Fox Valley Technical College's Sex Equity Research Project

WHO: Women interested in learning mechanical and electrical skills

WHERE: FVTC - Appleton Campus

WHEN: February 19 - May 14 (Tuesday evenings - 6:00-9:00 p.m.)

OR

February 21 - May 16 (Thursday mornings - 7:30-10:30 a.m.)

(Swing shift workers can attend one or the other depending on work schedule.)

COST: None - Child care and/or transportation reimbursements are available.

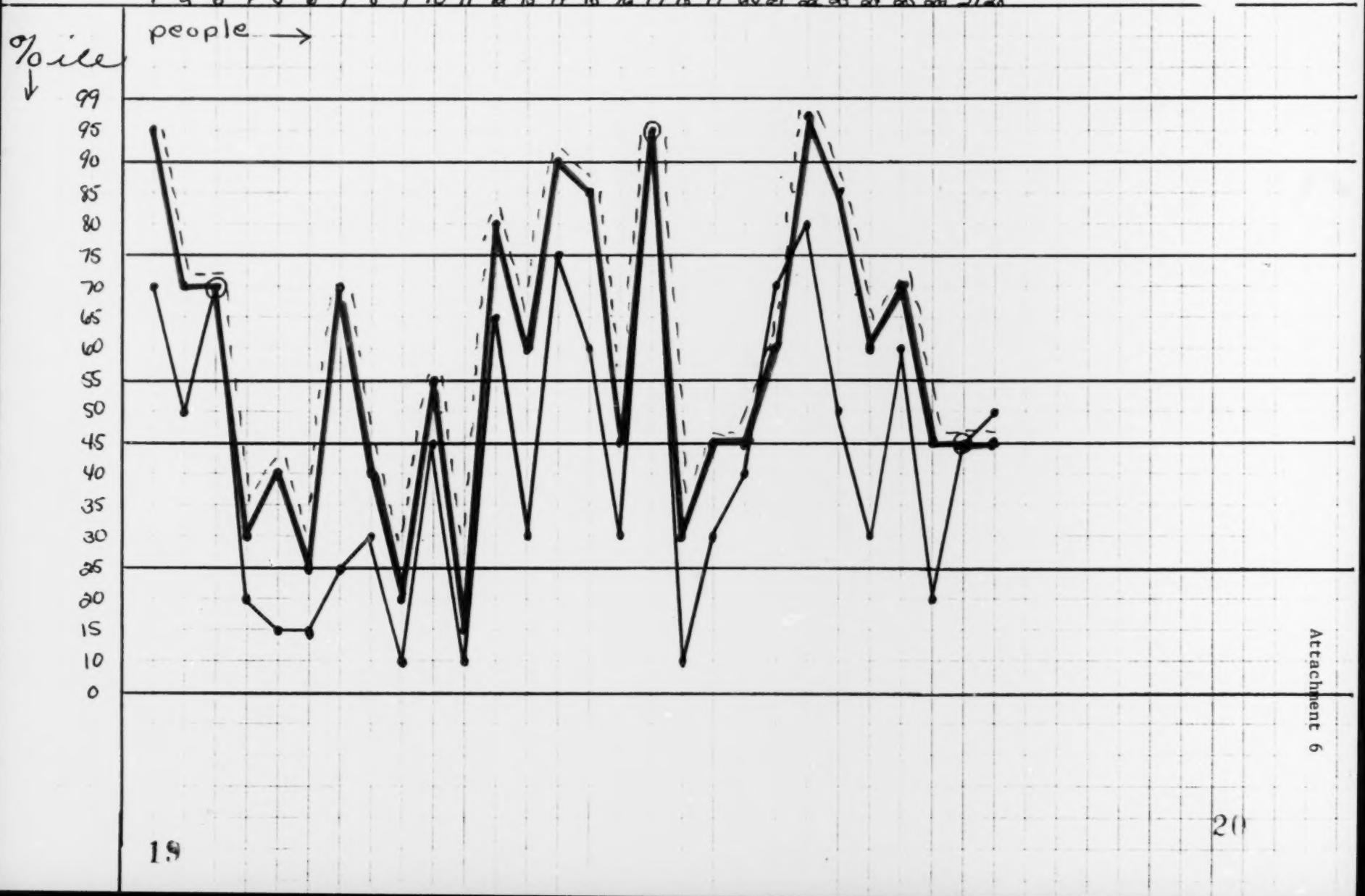
TO REGISTER: Call Connie Swift

8:30 a.m.-3:30 p.m. - 735-5693
Evenings - 731-1508

Fox Valley Technical COLLEGE

Mechanical Reasoning

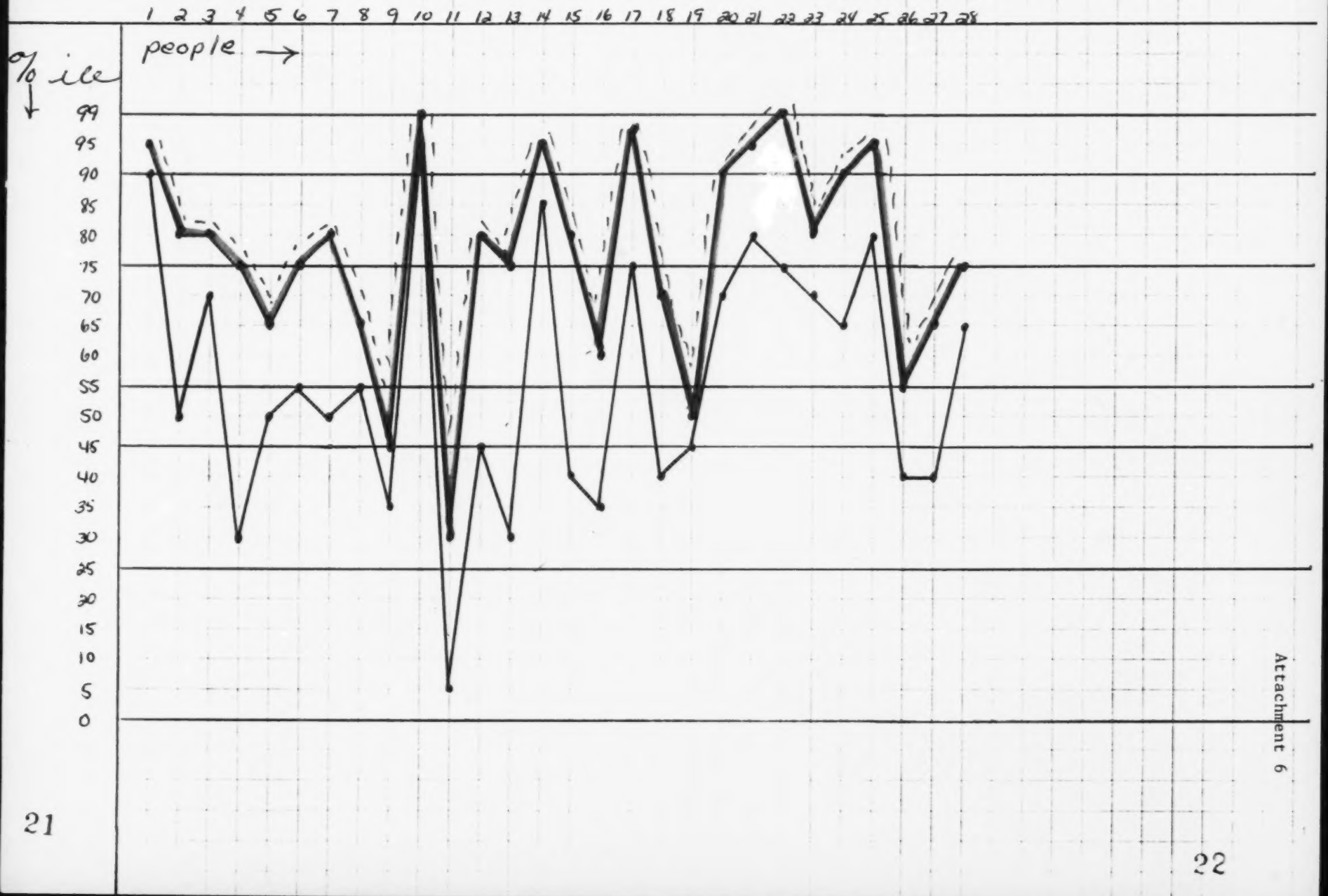
Session I –
Session II =



Attachment 6

Space Relations

Session I –
Session II = =



Attachment 6

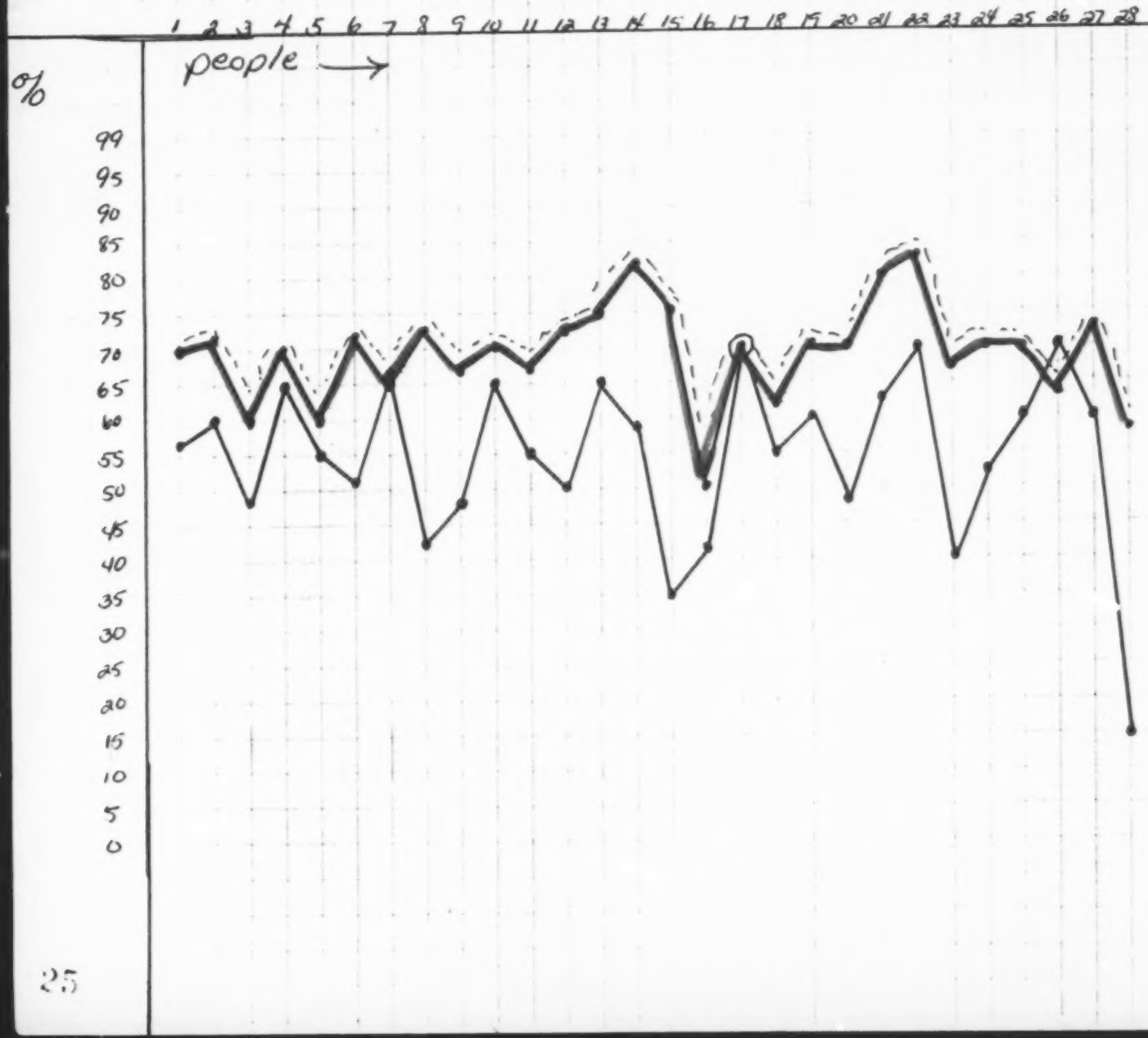
Abstract Reasoning

Session I —
Session II ═

Attachment 6

Electrical

Session I —
Session II ==



Attachment 6